ORIGINAL PAPER

A Comparison of the Effects of Ethics- Versus Wisdom-Based Mindfulness Practices on Prosocial Behaviour

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Abstract

Objectives The study aimed to examine the impact of incorporating Buddhist ethics-based practices versus Buddhist ethics- and wisdom-based practices in an 8-week mindfulness-based intervention (MBI) on prosocial behaviour.

Method Changes in behaviour were evaluated through the subcategories of monetary donation, prosocial attitudes, and volunteering engagement. Participants at a British university in China ($n=67$) were randomly assigned to either an MBI including concentration- and ethics-based practice (MBI-CE) or an MBI including concentration-, ethics-, and wisdom-based practice (MBI-CEW), with a study-as-usual control group. Throughout the intervention, participants attended weekly 2-hr face-to-face sessions and maintained daily meditation journals.

Results Results showed that MBI-CEW participants exhibited significant increases in prosocial behaviour compared to MBI-CE and controls. No significant difference was observed in dispositional mindfulness or ethical responsibility between intervention groups. However, the MBI-CEW group experienced greater changes in levels of sense of connectedness, as well as greater changes in levels of prosocial tendencies than the MBI-CE group.

Conclusions The findings emphasize the influence of integrating wisdom-based practices into MBIs on prosocial behaviour and suggest that transcending an individualistic sense of self may play a more prominent role in enhancing prosocial tendencies than heightened awareness or moral reasoning.

Preregistration This study was not preregistered

The study of psychological well-being has evolved beyond conventional metrics such as happiness and life satisfaction, now encompassing dimensions of social connectedness and prosocial behaviour (Seligman, 2002). Consequently, prosocial behaviour, broadly characterized as any action that benefits one or more recipients other than the originator (Pfattheicher et al., 2022), is recognized as a pivotal element contributing to a fulfilling and meaningful life. However, despite its significance, a comprehensive understanding of the factors influencing prosocial behaviour remains incomplete (Linwei et al., 2023).

In response to this, understanding the underlying mechanisms of prosocial behaviour has become an important focus of research into mindfulness-based interventions (MBIs; Berry et al., 2020). Some scholars suggest that prosocial behaviour is mediated within an MBI through the development of heightened attention towards others and improved self-control (Donald et al., 2019; Trautwein et al., 2020), while others propose a positive influence through increased other-oriented motivation and a growing sense of empathy and responsibility towards others (Feruglio et al., 2022). Conversely, some scholars suggest that empathetic concern may play a lesser role in enhancing prosocial tendencies, proposing instead that it is the erosion of an ego-centric bias that leads to enhanced prosocial outcomes (Furnell et al., 2024b; Kang, 2019; Pandey et al., 2018).

A possible reason for the current limited consensus on the underlying mechanisms of prosocial behaviour within MBIs may be attributed to the difficulty in identifying which meditation techniques specifically contribute to changes in behaviour. From a traditional Buddhist perspective, there

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are three distinct overarching types of meditation training which can be categorized as concentration (*samādhi*), ethics (*sīla*), and wisdom (*prajñā*) practices (Anālayo, 2017). *Samādhi* training (concentration-based practices) includes meditative techniques for stabilizing the mind and enabling the practitioner to concentrate with a calm and focussed awareness, whereas *sīla* training (ethics-based practices) encompass meditation techniques intended to purify the mind from unwholesome qualities such that the practitioner can think clearly and with compassion; and *prajñā* training (wisdom-based practices) comprises meditations centred around investigating and intuiting the nature of existence, in an effort to gain insight into non-duality and interdependence (Furnell et al., 2024a; see Table 1).

In general, "concentration" here is referring to Buddhist-based attentional meditations such as mindfulness meditation, while "ethics" is referring to Buddhist socio-ethical ideals and constructive meditations such as compassion and loving-kindness, as well as the five Buddhist moral precepts: (1) protect the sanctity of life, (2) refrain from stealing, (3) refrain from lust, (4) be loyal to the truth, and (5) refrain from intoxicants (Anālayo, 2024; Dalai Lama & Chodron, 2019; Shonin & Van Gordon, 2015). Finally, "wisdom" is referring to deconstructive meditations and the Buddhist concept of insight into the true nature of existence, namely impermanence, unsatisfactoriness, and no-self (Gallagher et al., 2023; Nhat Hanh, 1998). A similar categorization can be found in the distinct cognitive mechanisms within meditation practice discussed by Dahl et al. (2015). Specifically, they identify attentional meditations which closely maps to concentration-based practices; constructive meditations which relate to ethics-based practices; and deconstructive meditations which share similarities with wisdom-based practices.

Prior studies have demonstrated that distinct meditation practices produce varying effects on participants (Singer & Engert, 2019; Trautwein et al., 2020). While each type of practice primarily affects a specific outcome—such as concentration practices enhancing "presence", ethical practices influencing "affect", and wisdom practices shaping "perspective"—each practice also impacts all three outcomes to some extent (Böckler et al., 2018). Emerging evidence suggests that certain meditation types may be particularly effective in achieving specific outcomes for certain individuals (Dahl et al., 2015; Singer & Engert, 2019), leading to increased advocacy for incorporating a wider range of contemplative practices, beyond just mindfulness, in public health contexts (Knabb & Vazquez, 2023; Oman, 2023; Tempone-Wiltshire & Matthews, 2024). However, some MBIs have been criticized for integrating these diverse practices without proper distinction or categorization (Furnell et al., 2024b; Sedlmeier, 2023). Concerns in this regard are consistent with core Buddhist teachings such as the Noble Eightfold Path, whereby the notion of "Right Intention" implies that meditation does not by default imply the cultivation of ethics and/or wisdom qualities, particularly if the meditation practitioner's intention is not poised in the right way (Sapthiang et al., 2023).

Admittedly, within the academic literature, there has been some effort to distinguish between MBIs that focus primarily on concentration-based practices with those that explicitly incorporate both concentration- and ethics-based practices (Berry et al., 2020). In fact, this distinction forms part of the defining characteristics used to categorize MBIs into what have been termed as first-generation and second-generation interventions, with the former emphasizing concentration practices without the explicit inclusion of ethics, and the latter including ethics as an integral part of the programme (Shonin et al., 2014a, 2014b; Van Gordon & Shonin, 2020). However, although wisdom-based practices can be an integral feature of second-generation MBIs, it is only recently that a categorization system for MBIs has been proposed that recognises there exist different forms of second-generation MBIs according to their relative integration of concentration, ethics, and wisdom principles (Furnell et al., 2024a).

Consequently, there have been some contradictory findings when assessing the impact of first-generation and second-generation MBIs, specifically on prosocial outcomes. For example, the meta-analysis by Berry et al. (2020) that explored whether the explicit inclusion of ethics-based practices into MBIs has a positive impact on prosocial behaviour found no significant difference

Table 1 Categorization of concentration-, ethics-, and wisdom-based meditation practices

Concentration-based	Ethics-based	Wisdom-based
Related training: Concentration (*samādhi*)	Related training: Ethics (*sīla*)	Related training: Wisdom (*prajñā*)
Primary focus: Attention and interoceptive awareness practices	Primary focus: Practices that nurture compassion and regulate emotions	Primary focus: Changing perspective of self, embracing non-attachment and interconnectedness
Meditation type: Stabilizing	Meditation type: Purifying	Meditation type: Investigating and intuiting
Example of meditation practice: Awareness of breath	Example of meditation practice: Generating loving-kindness	Example of meditation practice: Contemplating interdependence

Table taken from Furnell et al. (2024b)

in prosocial behaviour when ethics-based practices were included. However, this contradicts findings by Chen and Jordan (2020) as well as by Brito-Pons et al. (2018), both of which support the idea that including ethics-based practices within MBIs promotes higher prosocial action relative to interventions with no ethical component. Interestingly, when assessing the MBIs implemented within both the studies by Chen and Jordan (2020) and Brito-Pons et al. (2018), it becomes evident that each intervention included not only ethics-based practices but also wisdom-based practices. For example, Chen and Jordan's (2020) intervention incorporated contemplating the interdependence of all beings, while the intervention by Brito-Pons et al. (2018) included embracing a shared common humanity and appreciating the deep interconnectedness between the self and others. These contradictory findings allude to a limitation in the current categorization of MBIs into just two broad groups (i.e. first- or second-generation) because as noted above, there are different categories of second-generation MBIs depending on whether wisdom practices are included in addition to concentration- and ethics-based practices (Furnell et al., 2024a).

Although several studies have explicitly incorporated Buddhist wisdom-based practices into MBIs to improve their effectiveness in enhancing mental well-being (Gamaiunova et al., 2024; Shonin et al., 2014a, 2014b; Stanely, 2022; Zheng et al., 2022) and prosocial behaviour (Bayot et al., 2020; Chen & Jordan, 2020), none have specifically differentiated between the application of ethics and wisdom principles in their design or data gathering. This has led to ambiguity around which practices specifically influence intervention outcomes.

From a traditional Buddhist perspective, any programme of meditation training that does not incorporate concentration-, ethics-, and wisdom-based elements may be incomplete in that it does not effectively enable the practitioner to transcend suffering by letting go of an erroneous attachment to an independent-permanent self (Anālayo, 2017). This attachment has been termed *ontological addiction* (Shonin et al., 2013; 2016) and it has been suggested that it may detrimentally affect prosociality, competitiveness, and pro-nature behaviour (Barrows et al., 2024). Likewise, it is theorized that the inclusion of wisdom-based practices into mindfulness practice and MBIs may lead to salutary outcomes (Lomas et al., 2017), including in prosocial behaviour due to their ability to diminish egocentric thought and cultivate insights into interdependence and self-transcendence, which are crucial factors leading to transformative shifts in behavioural actions and attitudes (Bahl et al., 2016; Leary et al., 2017). Additionally, Monterio et al. (2015) emphasize that MBIs excluding wisdom-based practices may serve to reinforce an individual's sense of self, rather than transcend it, and thus could negatively affect participants' prosocial behaviour.

Differences among MBIs in terms of their length, manner of administration, and content have presented challenges in assessing the relationship between MBIs and prosocial behaviour (Gamaiunova et al., 2022). For example, previous systematic reviews and meta-analyses assessing the impact of MBIs on behavioural outcomes have included studies ranging from one session to 13-weeks, some with in-person facilitation and others with online recorded materials, and each with various different combinations of concentration-, ethics-, and wisdom-based practices (Berry et al., 2020; Donald et al., 2019; Furnell et al., 2024b). This variety in intervention design and implementation has led to difficulties in gaining insight into the precise factors underlying prosocial behaviour.

Additionally, empirical research investigating the effects of MBIs on prosocial behaviour has operationalized it in various ways. These range from helping behaviour (Leiberg et al., 2011) to altruistic redistribution of funds (Weng et al., 2013), to reparative behaviour (Hafenbrack et al., 2022), and to monetary donation (Chen & Jordan, 2020), as well as via psychometric scales (Baumsteiger & Siegel, 2019; Caprara et al., 2005). In the case of the latter, it has been reported that there is a limited correlation between self-reported measures of prosocial behaviour and behavioural-based indicators (such as volunteering tasks, donation tasks, or game theoretical paradigms) (Furnell et al., 2024b). One reason given for this is that self-reported measures may be inflated due to perceived social desirability and other biases (Donlad et al., 2019). Likewise, issues may arise when equating prosocial behaviour to monetary donations, as an individual's socioeconomic background is not taken into account, and thus the proportionate value of the donation is not considered (Best & Fruend, 2021). Therefore, it has been recommended that future studies assess changes in prosocial behaviour through various methods such as a combination of psychometric scales, volunteering, and donation tasks (Furnell et al., 2024b).

This study was designed to address some of the aforementioned limitations caused by a lack of distinction between various MBIs and the meditation practices they entail, as well as the difficulties in assessing the meditation techniques and intervention elements that result in changes to prosocial behaviour. More specifically, we aimed to investigate the effects of two distinct 8-week MBIs, one including concentration- and ethics-based practices (MBI-CE; Group 1), and one including concentration-, ethics-, and wisdom-based practices (MBI-CEW; Group 2), on participants' levels of (a) prosocial behaviour, (b) dispositional mindfulness, (c) sense of connectedness, and (d) ethical responsibility, by comparison with a study-as-usual control group.

In doing this, we aimed to assess if the additional inclusion of wisdom-based practices into MBIs has a significant influence on outcome measures. Additionally, we aimed to

not only gain insight into the relationship between ethics- and wisdom-based practices with prosocial behaviour but to also explore the interaction effects of dispositional mindfulness, sense of connectedness, and ethical responsibility on prosocial tendencies.

Before conducting the study, we established five null hypotheses designed to test the effectiveness and specific impacts of the interventions on various psychological and behavioural outcomes: (1) there will be no significant difference in changes in dispositional mindfulness levels between the intervention groups and the control group; (2) there will be no significant difference in changes of dispositional mindfulness levels between the MBI-CE and MBI-CEW groups; (3) there will be no significant difference in changes in levels of ethical responsibility between the MBI-CE group and the MBI-CEW group; (4) there will be no significant difference in changes in levels of sense of connectedness between the MBI-CE group and the MBI-CEW group; and (5) there will be no significant difference in changes in levels of prosocial behaviour between the MBI-CE group and the MBI-CEW group.

Method

Participants

Recruitment of participants took place over a 1-month period (September 2023) prior to the commencement of the interventions. Recruitment was conducted at a British university in mainland China and drawn from the foundation year and undergraduate student population. The interventions were offered as part of the university career service's Advantage Award scheme (a scheme focussed on providing students with the opportunity to develop attributes, capabilities, and skills to enhance their overall learning experience and employability). Recruitment was implemented via online flyers, an introductory presentation at the Advantage Award scheme module fair and promoted on the university career services website. Promotional materials presented five key learning objectives to potential participants: (1) develop focus and attention in the present moment; (2) manage emotions to stay calm and relaxed; (3) meditate to look deeply at yourself, relationships, and the world; (4) explore contemporary issues through philosophical discussion and critical thinking; and (5) build a supportive community to share, grow and meditate with. Additionally, all promotional materials explicitly mentioned that Buddhist meditation and philosophical concepts would be used throughout the course.

The inclusion criteria were as follows: (1) aged 18–24 years, (2) enrolled at the British university in mainland China for year 1 to year 4 of study (i.e. foundation year and undergraduate students only); (3) no prior participation in any formal mindfulness-based intervention (such as Mindfulness-Based Stress Reduction (MBSR) or Mindful Self Compassion); (4) a strong command of the English language (required to have either a Gaokao score of at least 115 in English, Level 5.5 in the International English Language Testing System, or equivalent), and (5) ability and desire to attend all in group sessions and complete home assignments.

Procedure

This study was conducted based on the Consolidated Standards for Reporting Trials (CONSORT) guidelines (see Fig. 1; Butcher et al., 2022; Moher et al., 2010). A three-arm parallel-group design was employed using a study-as-usual control group, a MBI including concentration- and ethics-based practices (MBI-CE; Group 1), and a MBI including concentration-, ethics-, and wisdom-based practices (MBI-CEW; Group 2). The study-as-usual control group consisted of participants who were enrolled at the same university as those in the intervention groups. However, they continued with their usual academic activities and did not participate in any MBIs.

Data collection occurred at four critical time points to capture the evolution of participants' responses over the course of the study: T0 (baseline; prior to the commencement of any intervention), T1 (post-concentration-based practices; at the end on intervention Stage 1), T2 (post-ethics-based practices; at the end of intervention Stage 2), T3 (post-intervention; at the end of intervention Stage 3) (see Figure 1 for details). Qualitative data were also collected to give further insight into participants' perceptions of the interventions, the inclusion of explicit Buddhist principles, and the underlying factors influencing changes in their behaviour (reported elsewhere).

The Ethics Committees of the primary researcher's affiliated university and the academic institution where the research was conducted both approved the study.

The intervention design for both Group 1 (an MBI including concentration- and ethics-based practices; MBI-CE) and Group 2 (an MBI including concentration-, ethics- and wisdom-based practices; MBI-CEW) mirrored the format of established mindfulness interventions, such as MBSR, in various ways (e.g. programme duration, group-based instruction, provision of guided weekly meditation materials, inclusion of formal and informal meditation journals — see Appendix). However, a key difference included the explicit mention and incorporation of Buddhist ethics and wisdom principles into the interventions. The ethics-based practices mainly consisted of the Four Immeasurables (*Brahmavihārās*), including loving-kindness, compassion, empathetic-joy, and equanimity meditation practices, while the wisdom-based practices mainly comprised contemplations on impermanence, non-attachment, interdependence,

Fig. 1 Representation of programme flow and data collection (T0–T3)
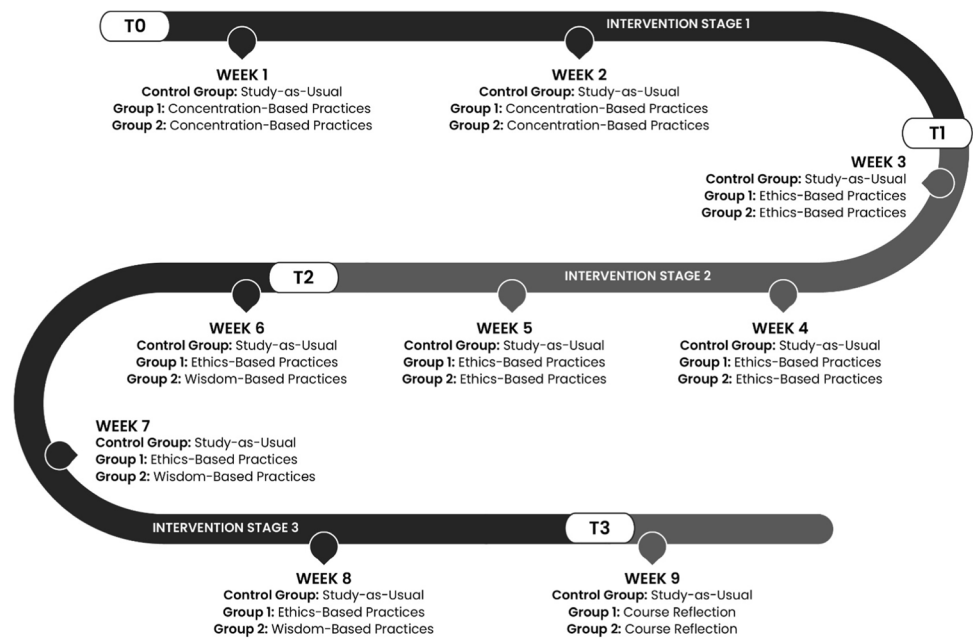
and no-self. Instruction on how to incorporate such ethics- and wisdom-based practices into an MBI largely drew inspiration from previous intervention designs, particularly Mindfulness Awareness Training (MAT; Van Gordon et al., 2014).

The two 8-week MBIs included within this study took place between October and December 2023 and were structured as follows:

Session format: The programme consisted of eight 2-hr group sessions, plus a ninth for reflection and graduation (Fig. 1). Each session included a review of the previous week's formal and informal meditation practice, an interactive seminar on the week's topic, and a guided meditation (see Appendix). Sessions were held in a university Drama Room for a more comfortable setting.

Weekly topic overview: Both MBI-CE and MBI-CEW followed the same topics for the first 5 weeks. In the first 2 weeks (Stage 1), the focus was on breath and body awareness: (1) breath: present-centred awareness and (2) mindfulness of the body. The next 3 weeks (Stage 2) emphasized ethical awareness: (3) feelings response, (4) mind observation, and (5) purifying the mind. In the final 3 weeks (Stage 3), MBI-CE continued with ethics: (6a) compassion, (7a) sympathetic-joy, and (8a) equanimity, while MBI-CEW introduced wisdom principles: (6b) impermanence, (7b) attachment, and (8b) interdependence (see Appendix for details on each topic).

Attendance: Participants needed to attend at least seven of the eight sessions to complete the course. If a session was missed, a "make-up worksheet" covering key teachings was required, with only one allowed per participant. Completion earned a certificate and ten credits towards the university's Advantage Award scheme.

Self-practice: Participants were requested to make at least five entries in a meditation journal each week. After each session, they received an email with the week's meditation themes, a written outline, and of a recorded guided meditation. They practised the recording at least once during the group session and could choose to use it for personal practice. Weekly informal meditation practice encouraged integrating each week's practice into daily life.

Both the MBI-CE and MBI-CEW were administered by the same facilitator (and primary author) who is trained in MBSR, MAT, and the Buddhist four foundations of mindfulness (*Satipaṭṭhāna*) practice (as well as holding a *NeuroMindfulness* coaching certificate accredited by the International Coaching Federation). As detailed further below, to mitigate any potential bias, participants were asked to evaluate the facilitator's performance and enthusiasm for each intervention (i.e. with any significant differences in responses being analysed accordingly).

Measures

Prosocial Behaviour

To account for the difficulties in assessing prosocial behaviour (Donlad et al., 2019), three separate assessment means were used to help triangulate findings and give an accurate representation of prosocial tendencies. These included (1) self-reported prosocialness using a psychometric scale; (2) a volunteering task; and (3) a monetary donation task.

Prosocialness Scale for Adults

The Prosocialness Scale for Adults (PSA; Capara et al., 2005) was used to assess differences in individual self-reported prosocial tendencies. The PSA is a 16-item scale which considers four types of actions: sharing, helping, taking care of, and feeling emphatic with others and their needs or requests, with items such as "I am pleased to help my friends/colleagues in their activities" and "I am available for volunteer activities to help those who are in need". Scoring is frequency-based and follows a 5-point Likert scale (ranging from "never true" to "always true") with higher scores reflecting greater degrees of prosocialness. McDonald's Omega reliability estimates were 0.93 for the PSA, indicating excellent internal consistency.

Volunteering Task

Designed in a similar way to the volunteering task used by Poulin et al. (2021), an optional homework was offered to participants inviting them to voluntarily take part in The Hunger Site's "Click to Give" program (https://thehungersite.greatergood.com/clicktogive) during Intervention Stage 2, as well as donate time to sign petitions for environmental and social justice causes on The Hunger Site website (https://thehungersite.greatergood.com/clicktogive/ths/take-action?) during Intervention Stage 3. Participants who volunteered to take part in these campaigns were not instructed on how many programs to "click" or how many petitions to sign but could complete as many as they wished. Prosocial behaviour was assessed using a 5-point Likert scale (ranging from "0" to "6+") answering the questions "How many charity organizations did you click on?" and "How many charity petitions did you sign?". The number of programs "clicked" acted as a baseline measurement and was compared with the number of petitions signed.

Monetary Donation Task

Designed in a similar way to Chen and Jordon's (2020) monetary donation task, on completion of all psychometric scales, participants were entered into a raffle for 1000RMB. They were then offered the option to either "Keep my own ticket in the 1000RMB raffle" or "Donate my ticket to the World Food Program, potentially providing 135 emergency meals for hungry people". The response choice to this question was then used as a measure of prosocial behaviour.

Dispositional Mindfulness

The mindful attention and awareness scale (MAAS; Brown & Ryan, 2003) was used to assess dispositional mindfulness. The MAAS is a 15-item scale with items such as "I find myself preoccupied with the future or the past" and "I find myself doing things without paying attention". Scoring is frequency-based and follows a 6-point Likert scale (ranging from *almost always* to *almost never*) with higher scores reflecting greater degrees of dispositional mindfulness. McDonald's Omega reliability estimates were 0.84 for the MAAS, indicating good internal consistency.

Sense of Connectedness

The Watts Connectedness Scale (WCS; Watts et al., 2022) was used to assess levels of connectedness to self (Q1–Q6), others (Q7–Q12), and the world (Q13–Q19). The WCS is a three-dimensional index of felt connectedness with a 19-item scale including items such as "I have felt connected to friends and/or family" and "I have felt connected to all humanity". Participants are asked to use a sliding scale (ranging from "0; *not at all*" to "100; *entirely*") to reflect on their level of connectedness over the past 2-week period. McDonald's Omega reliability estimates were 0.79 for the Connectedness to Self subscale, 0.52 for the Connectedness to Others subscale, 0.84 for the Connectedness to the World subscale, and 0.80 for the full WCS scale, indicating acceptable internal consistency.

Ethical Responsibility

The Responsibility Questionnaire (RQ; Arslan & Wong, 2021) was administered to assess levels of Personal Responsibility (Q1–Q4) and Social Responsibility (Q5–Q8). Personal Responsibility refers to self-accountability, representing an individual's behaviours and choices that can impact oneself and others (Mergler & Shield, 2016), while Social Responsibility is related to values that promote moral, prosocial, and civic behaviours of individuals (Wray-Lake & Syvertsen, 2011) and involves decisions and actions that serve to benefit others and society (Martins et al., 2015). The RS is a two-dimensional index of self-reported responsibility based on an 8-item scale including items such as "even in difficult circumstances, I still choose to do what is right rather than what is expedient" and "I am morally accountable for how I treat others". Scoring is frequency-based and follows an 8-point Likert scale (ranging from *strongly agree* to *strongly disagree*) with higher scores indicating higher levels of personal and social responsibility. McDonald's Omega reliability estimates were 0.71 for the Personal Responsibility subscale, 0.65 for the Social Responsibility subscale, and 0.73 for the full RQ scale, indicating acceptable internal consistency.

Checks and Balances

To mitigate any potential bias the facilitator may have had towards the MBI-CE or the MBI-CEW, participants were asked to provide an evaluation of the teacher and module at

the conclusion of the course. This was designed in a similar way to the university's standard Student Evaluation of Teacher (SET) and Student Evaluation of Module (SEM) feedback forms. The SETs contained a 5-item scale including items such as "The instructor was well prepared for each class". Likewise, the SEMs contained a 5-item scale including items such as "The course was organized in a manner that helped me understand the concepts and meditation practices". Scoring for both feedback forms is frequency-based and follows a 5-point Likert scale (ranging from "*strongly agree*" to "*strongly disagree*"). Additionally, a final item was included at the end of the SET asking "Overall, how satisfied are you with the instructor of the course?" and at the end of the SEM asking "Overall, how satisfied are you with the quality of the course?". Scoring for these items followed a 5-point Likert scale (ranging from "*Extremely Satisfied*" to *Extremely Unsatisfied*").

Data Analyses

Data Collection

Dedicated time for data collection was provided during the beginning of the given weekly group sessions (i.e. Weeks 3, 5 and 9), while T0 data was gathered during a preliminary information session for the intervention. Participants completed a series of online psychometric scales and measures via Qualtrics, designed to assess the previously stated outcome measures. Participants were left alone in the room during data collection to avoid potential influences on their responses.

Randomization and Blinding

Interested participants completed an online screening survey distributed through the university career service's website. To balance various covariates, we performed a multi-block stratified randomization (Kang et al., 2008) to sort eligible participants into either Group 1 or Group 2. The three identified covariates before this study began were (a) ethnicity (as participants' cultural backgrounds may influence their acceptance of meditation); (b) religion (due to the inclusion of Buddhist practices throughout the interventions); and (c) gender (as there may be differences in prosocial behaviour between males and females).

After information on the identified covariates had been collected from all interested participants, they were assigned into their given block. Simple stratified randomization was then performed within each block to assign participants to Group 1 or Group 2 (randomization was performed using an online software—http://www.randomization.com). To minimize selection bias, group allocation occurred after participant screening but before the

baseline assessment. Enrolled participants were aware of the types of meditation practices they engaged in but were blind to the specific research aims of the study. Finally, after assessing the quantity of interested participants for the intervention groups ($n=50$), a convenience sample, matching the intervention groups in covariates, was taken for the study-as-usual control.

Efficacy parameters were analysed based on the intention-to-treat (ITT) population, defined as all allocated participants, applying the last-observation-carried-forward (LOCF) approach to impute missing data. Specifically, the missing data percentages for the outcome measures (RQ, WCS, MAAS, and PSA) were as follows: 2.38% for the MBI-CE group, 6.25% for the MBI-CEW group, and 25.96% for the control group. Initial visual inspection of frequency histograms suggested normal distribution without any outliers in the data, which justified the use of parametric tests for further statistical analysis.

The statistical analysis was carried out in three distinct phases:

To assess the overall effect of the interventions on outcome measures (MAAS, WCS, RQ, PSA), we used an initial repeated measures analysis of variance (ANOVA) to focus on changes of dependant variables (defined as the separate outcome measures) within the MBI-CE, MBI-CEW, and control groups between data points T0 and T3 (pre–post test scores). In instances where significant differences were identified, post hoc tests were employed to evaluate the distinctions between interventions. Unless specified otherwise, statistics derived from Tukey's honestly significant difference (Tukey's HSD) test are reported. Chi-square tests were performed on the outcomes of the Donation Task to evaluate the presence of a statistically significant relationship between group membership and the decision to donate.

We then conducted a detailed comparison of the effects of the MBI-CE and MBI-CEW interventions by running separate two-way mixed-measures ANOVA for the outcome measures (MAAS, WCS, RQ, PSA, and Volunteering Task) over four different time points (T0, T1, T2, and T3) throughout the interventions. Following the identification of significant effects, we applied multivariate tests, specifically Wilks' Lambda statistics, to further analyse the variations in each dependent variable.

In instances where the previous multivariate tests identified a significant interaction between the interventions and outcome measures, a one-way ANCOVA was performed, following guidelines by Khammar et al. (2020). This phase focused on evaluating the impact of incorporating wisdom-based practices during the third stage of the MBI-CEW intervention. To ensure accurate assessment, variations from the initial stages (T0 to T2) were controlled for by using the

T2 test scores as covariates in the ANCOVA. This adjustment was crucial for specifically isolating and assessing the changes attributable to the third stage of the intervention, from T2 to T3.

In cases where significant main effects or interactions were observed across various dependent variables, change scores were calculated. Subsequently, Pearson's correlation was used to examine whether changes in one variable were associated with changes in another. This analysis aimed to explore the potential interaction effects of heightened awareness, moral reasoning, and sense of connectedness on prosocial behaviour.

Furthermore, to evaluate potential facilitator bias, a univariate two-way ANOVA was employed. This analysis compared the mean responses of MBI-CE and MBI-CEW participants' evaluation of instructor preparedness, course organization, and overall satisfaction with both the instructor and the course.

Effect sizes were quantified using partial eta^2 for the analysis of variance tests, and Cohen's d statistic for comparisons between two independent means. All analyses were performed using SPSS version 20. The sample size was limited to the maximum number of students available (i.e. those who signed up to participate in the Advantage Award module). Despite these limitations, a posteriori power analysis conducted using G*Power indicated that with an effect size of 0.3 and an alpha level of 0.05, the study achieved a power of approximately 81.60%.

Results

Study Population

Details of participant flow are provided in Fig. 2. Out of 50 individuals interested in participating in the interventions, nine did not meet the inclusion criteria. The resulting sample of 41 participants were randomly allocated into two experiential groups (Group 1: n=21; Group 2: n=20). An additional 37 individuals were assessed for eligibility into the study-as-usual control group. Eleven declined to participate while the remaining participants were allocated into the control (n=26). Across the three groups, 13 participants did not complete all four sets of psychometric scales (T0 – T3), resulting in their last observation being carried forward where applicable.

Baseline details for the 67 participants allocated into the study are shown in Table 2. All participants identified themselves as ethnically Chinese and only four participants (6.25%) identified as Buddhists. There were no statistically significant differences at baseline between study groups in religion, ethnicity, age, or gender.

Phase 1

Table 3 shows descriptive statistics for all time points on each of the dependent variables for the three study groups. Figure 3 depicts the graphical representation of descriptive statistics for test scores (T0 and T3) on relevant dependent variables between MBI-CE, MBI-CEW, and Control.

Analysis of the MAAS showed a statistically significant effect of time ($F_{(2,64)}$=8.45, p=0.01, η^2=0.12), and a slight trend towards statistical significance for the group by time interaction ($F_{(2,64)}$=2.18, p=0.12, η^2=0.06). The RQ for Personal Responsibility (Q1 to Q4) did not show a significant difference among programmes, whereas the Social Responsibility (Q5 to Q8) showed a significant effect for group by time interaction ($F_{(2,64)}$=4.16, p=0.02, η^2=0.12). Analysis of WCS for Connectedness to Self (Q1 to Q6) and Connectedness to the World (Q13 to Q19) showed a significant effect of time ($F_{(1,64)}$=9.40, p=0.003, η^2=0.13) and ($F_{(1,64)}$=24.765, p<0.001, η^2=0.28) respectively, but not a group by time interaction. Connectedness to Others (Q7 to Q12) showed a significant effect of group by time interaction ($F_{(2,64)}$=6.25, p=0.003, η^2=0.16), indicating variability in the efficacy of the distinct programmes. Analysis of the PSA revealed the following results for group by time interaction: ($F_{(2,64)}$=2.63, p=0.08, η^2=0.08).

Post hoc analysis (Tukey's HSD) of the MAAS revealed statistically significant differences in dispositional mindfulness between the control group and both intervention groups. Specifically, compared to the control group, the MBI-CE group exhibited a mean difference of −8.12 (95%CI −14.52 to −1.72, p=0.001), while the MBI-CEW group showed a mean difference of −11.71 (95%CI −18.20 to −5.22, p<0.001).

The Chi-square tests revealed a statistically significant association (χ^2(2)=15.30, p≤0.001; likelihood ratio χ^2(2)=16.79, p<0.001] between group membership and the decision to donate. Participants of MBI-CE and MBI-CEW were significantly more likely to donate than those of the control group.

Phase 2

Figure 4 depicts the graphical representation of descriptive statistics for test scores (T0, T1, T2, and T3) on the dependent variables of Connectedness to Others (WCS: Q7 to Q12) and self-reported prosocial behaviour (PSA) for MBI-CE and MBI-CEW groups. The descriptive statistics for test scores of the Volunteering Task are also depicted (T2 and T3).

Analysis of the MAAS showed a significant effect of time ($F_{(3,37)}$=2.90, p=0.005, η^2=0.19) but not a group by time interaction, indicating that the specific programmes' effectiveness did not vary between groups. The
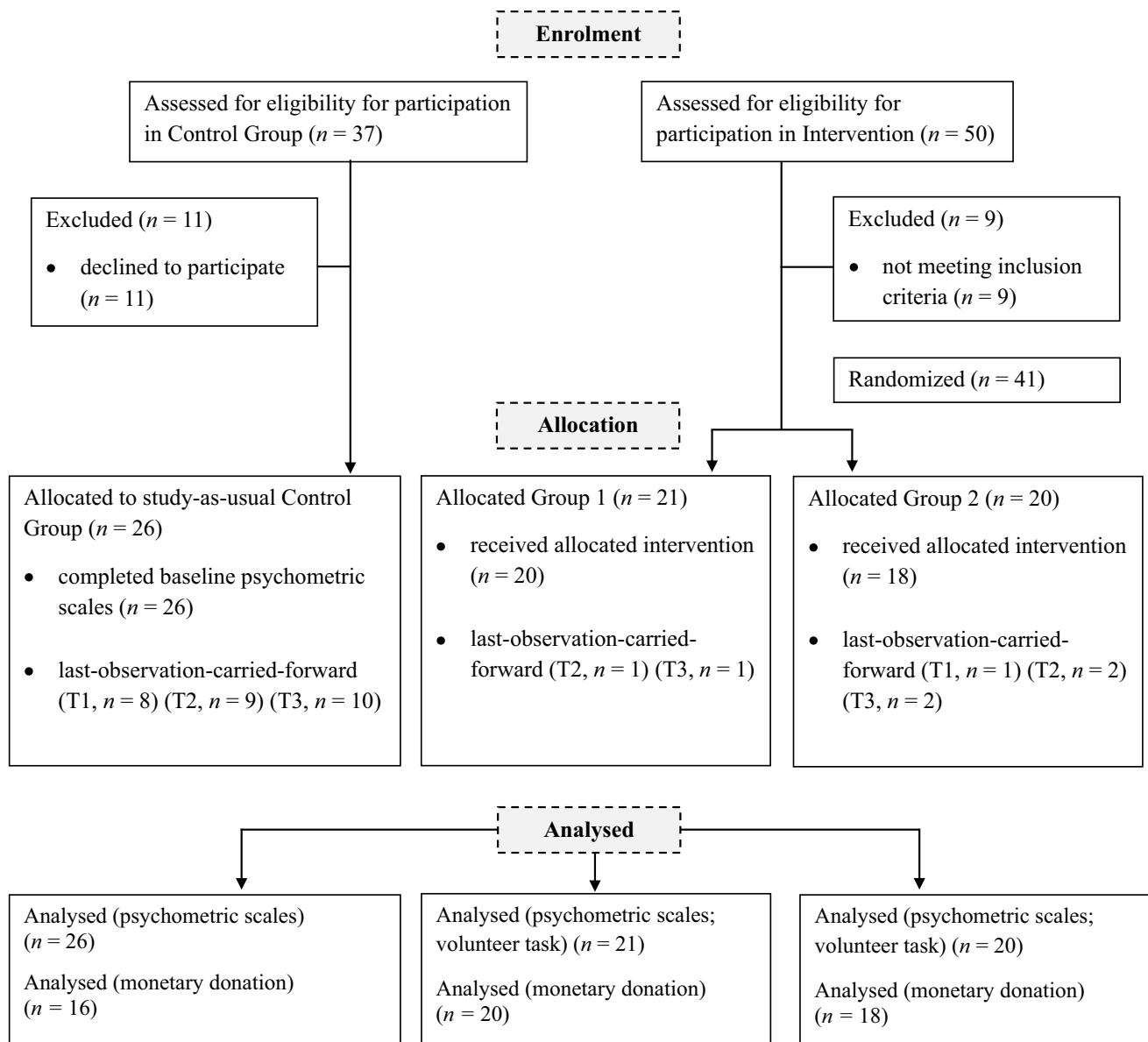
Fig. 2 CONSORT flow diagram of participants

RQ for Personal Responsibility (Q1 to Q4) did not show a significant effect of time or group by time interaction, whereas the multivariate analysis of the RQ for Social Responsibility (Q5 to Q8) showed a significant effect of time ($F_{(3,37)}$=3.68, p=0.02, η^2 =0.23) but not a group by time interaction. The WCS for Connectedness to Self (Q1 to Q6) and Connectedness to the World (Q13 to Q19) showed a significant effect of time, ($F_{(3,37)}$=3.30, p=0.03, η^2 =0.21) and ($F_{(3,37)}$=13.37, p<0.001, η^2 =0.52) respectively, but not a group by time interaction. Connectedness to Others (Q7 to Q12) showed a significant effect of group by time interaction ($F_{(3,37)}$=4.32, p=0.01, η^2 =0.26), indicating variability in the efficacy of the distinct programmes when evaluated at various intervals throughout the intervention period.

Analysis of the PSA did not show a significant effect of time but showed a significant effect of group by time interaction ($F_{(3,37)}$=3.24, p=0.03, η^2 =0.21), indicating a potential difference in the specific programmes' effectiveness across stages of the intervention. Likewise, analysis of the Volunteering Task did not show a significant effect of time but showed a significant effect of group by time interaction ($F_{(1,39)}$=5.02, p=0.03, η^2 =0.11).

The Chi-square tests revealed no statistically significant association between MBI-CE and MBI-CEW membership and the decision to donate.

Table 2 Participants' characteristics

	Group 1 MBI-CE ($n =$ 21) n (%)	Group 1 MBI-CEW ($n =$ 20) n (%)	Control Group ($n = 26$) n (%)
Nationality			
Chinese	21 (100%)	20 (100%)	26 (100%)
Religion			
None	19 (90.48%)	18 (90%)	24 (92.31%)
Buddhist	1 (4.76%)	2 (10%)	1 (3.85%)
Prefer not to answer	1 (4.76%)	0	1 (3.85%)
Age			
18–19	16 (76.19%)	16 (80%)	26 (100%)
20–21	4 (19.05%)	3 (15%)	0
21+	1 (4.76%)	1 (5%)	0
Gender			
Male	3 (14.29%)	2 (10%)	9 (34.62%)
Female	18 (85.71%)	18 (90%)	17 (65.84%)

Phase 3

Table 4 reports the estimated marginal means of the ANCOVA.

ANCOVA results for the Connectedness to Others scale revealed a significant effect on the dependent variable (change in scores from T2 to T3) while controlling for the impact of the covariate (T2 scores). The covariate significantly influenced the outcomes at T3 ($F_{(1,38)}$=16.17, $p<0.001$, η_p^2 =0.23). Moreover, after controlling for T2 scores, the analysis revealed a significant main effect of intervention group on the change in scores from T2 to T3 ($F_{(1,38)}$=10.04, p=0.003, η_p^2 =0.21). This indicates that, beyond the initial score levels at T2, the specific intervention group (MBI-CE vs MBI-CEW) significantly affected the score changes.

ANCOVA results for self-reported prosocial behaviour (PSA) revealed a significant influence of pre-existing scores (T2) on the dependent variable (change in scores from T2 to T3), while controlling for the impact of these covariate scores. Specifically, the covariate (T2 scores) significantly affected the outcomes at T3 ($F_{(1,38)}$=11.77, p=0.001, η_p^2 =0.24). However, after adjusting for T2 scores, the analysis did not reveal a significant main effect of the intervention group on the change in scores from T2 to T3. The Group variable exhibited ($F_{(1,38)}$=2.82, p=0.10, η_p^2 =0.07), indicating that although the pre-existing scores significantly contribute to the outcomes, the specific intervention group, independent of these conditions, does not significantly influence the change in scores from T2 to T3.

ANCOVA results for the Volunteering Task revealed a significant influence of pre-existing scores (T2) on the dependent variable (change in scores from T2 to T3), while controlling for the impact of these covariate scores. Specifically, the covariate (T2 scores) significantly affected

the outcomes at T3 ($F_{(1,38)}$=48.83, $p<0.001$, η_p^2 =0.57), indicating a strong effect of pre-existing conditions on the change observed. Furthermore, after adjusting for T2 scores, the analysis showed a significant main effect of the intervention group on the change in scores from T2 to T3 ($F_{(1,38)}$=10.26, p=0.003, η_p^2 =0.21). This indicates that, beyond the initial score levels at T2, the specific intervention group (MBI-CE vs MBI-CEW) significantly influences the score changes.

A Pearson correlation coefficient was computed to determine the relationship between Connectedness to Others and Volunteering Task test results during Intervention Stage 3 (change in scores from T2 to T3). For the MBI-CEW group, there was a significant positive relationship between Connectedness to Others and Volunteering Task test results (r(20)=0.49, p=0.03), suggesting that as the level of sense of connectedness to others increases, so does prosocial behaviour of participants. A Pearson correlation coefficient was also computed to determine the relationship between the reduction in Connectedness to Others (WCS: Q7–Q12) and reduction in self-reported prosocial behaviour (PSA) of the MBI-CE group, with test results (r(21)=0.79. p=0.59).

Facilitator Bias

Results of the univariate two-way ANOVA revealed no statistically significant differences between MBI-CE and MBI-CEW participants' evaluation of the instructor's preparedness for the course ($F_{(1,37)}$=0.53, p=0.47, η_p^2 =0.01) or the course organization ($F_{(1,37)}$=2.75, p=0.11, η_p^2 =0.07). Likewise, there were no statistically significant differences between MBI-CE and MBI-CEW participants' overall satisfaction with the instructor (F(1,37)=0.45, p=0.51, η_p^2 =0.01) or course ($F_{(1,37)}$=0.75, p=0.39, η_p^2 =0.02).

Table 3 Descriptive statistics of all means and standard deviations

Outcome measure	Group	T0 (baseline) Mean	SD		T1 Mean	SD		T2 Mean	SD	T3 (endpoint) Mean	SD
MAAS	MBI-CE	51.33	7.59		52.14	4.28		52.95	5.51	53.43	5.15
	MBI-CEW	53.75	10.63		55.35	11.16		59.15	9.66	59.90	8.60
	Control	44.96	11.56		47.00	11.44		46.77	11.57	45.27	14.03
WCS											
Q1–Q6	MBI-CE	390.95	91.97		421.90	76.46		410.48	82.19	435.24	92.61
	MBI-CEW	391.00	76.43		393.50	70.58		415.00	56.24	430.50	60.91
	Control	398.46	117.43		413.85	90.11		398.46	88.80	415.38	102.62
Q7–Q12	MBI-CE	291.90	81.09		271.90	94.85		272.86	83.01	250.48	77.75
	MBI-CEW	282.00	65.10		288.50	66.75		302.00	76.13	326.00	65.65
	Control	275.38	76.28		301.92	99.72		298.85	91.32	285.38	100.41
Q13–Q19	MBI-CE	377.62	125.77		402.86	138.86		415.24	153.09	470.48	123.96
	MBI-CEW	402.50	102.75		406.00	100.18		443.50	105.79	485.50	75.64
	Control	407.69	154.77		405.00	134.77		411.92	154.76	433.08	142.43
RQ											
Q1–Q4	MBI-CE	15.29	2.22		15.00	2.74		15.33	1.98	16.19	1.66
	MBI-CEW	14.60	3.53		14.05	3.58		14.50	3.24	14.35	3.13
	Control	15.35	2.48		13.88	2.50		14.19	2.40	14.77	3.23
Q5–Q8	MBI-CE	15.86	1.59		15.86	2.03		16.14	1.24	17.29	1.79
	MBI-CEW	15.55	2.48		16.35	3.10		15.65	2.35	16.00	2.32
	Control	15.46	2.78		15.23	3.34		14.77	3.22	15.04	2.88
Prosocial behaviour											
PSA	MBI-CE	38.00	9.04		39.33	9.31		35.19	10.26	35.38	10.22
	MBI-CEW	35.65	12.12		36.45	11.22		37.50	11.44	39.45	8.66
	Control	36.54	11.85		38.58	10.93		38.69	11.53	36.58	11.06
Volunteering	MBI-CE	N/A	N/A	N/A		N/A		1.10	1.14	0.95	0.87
	MBI-CEW	N/A	N/A	N/A		N/A		1.05	1.19	2.20	1.524
Donation task		**Donated**	**Kept**	**Donate (expected)**	**Keep (expected)**						
	MBI-CE	12	8	10.40	9.60						
	MBI-CEW	14	4	9.30	8.70						
	Control	2	14	8.30	7.70						

MAAS Mindful Attention Awareness Scale, *WCS* Watt's Connectedness Scale, *RQ* Responsibility Questionnaire, *PSA* Proscocialness Scale for Adults

Discussion

The present study sought to assess the benefits to prosocial behaviour of including Buddhist wisdom- and ethics-based practices into an 8-week MBI (MBI-CEW) compared to the inclusion of Buddhist ethics-based practices alone (MBI-CE). Prosocial behaviour was evaluated through the sub-categories of monetary donation, prosocial attitudes, and volunteering engagement.

Returning to the study's null hypotheses, the first hypothesis was rejected, as there was a significant difference in dispositional mindfulness levels between the intervention groups and the control group. However, the second hypothesis was not rejected, indicating no significant difference in mindfulness levels between the MBI-CE and MBI-CEW groups. Similarly, the third hypothesis was not rejected due to the absence of significant differences in levels of ethical responsibility between the intervention groups. In contrast, the fourth and fifth hypotheses were rejected. The MBI-CEW group demonstrated greater changes in sense of connectedness, as well as prosocial tendencies, as evidenced by the volunteering task and prosocial attitude scales, compared to the MBI-CE group. These findings suggest that it may be a growing sense of connectedness to others and erosion of an individualistic sense of self that play a more prominent role in enhancing prosocial tendencies than heightened awareness or moral reasoning.

The results demonstrated that when compared to controls, participants of both intervention groups were significantly more likely to make a monetary donation. Results for

Fig. 3 Outcome variable mean scores. Pre–post changes in mean scores for the control group (*dotted line*), MBI-CE group (*solid line*), and MBI-CEW group (*dashed line*)
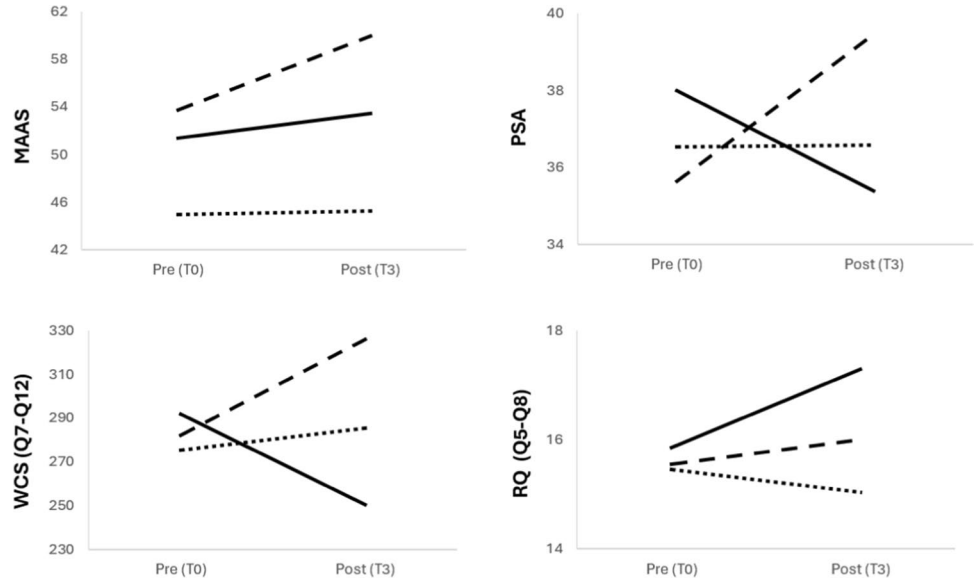
Fig. 4 Outcome variable mean scores. All mean scores for MBI-CE group (*solid line*) and MBI-CEW group (*dashed line*) for WCS, PSA, and volunteering task
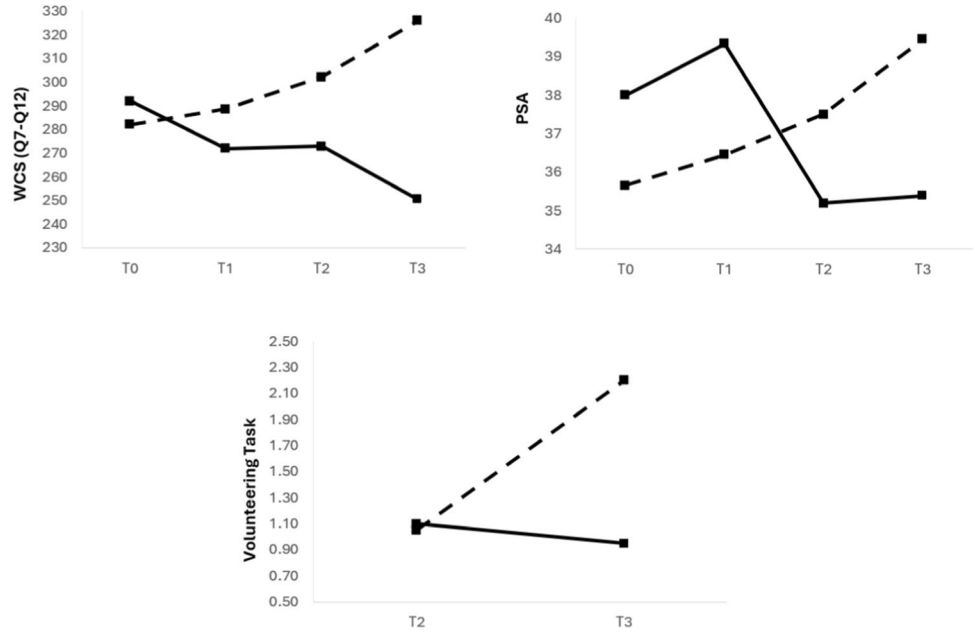
Table 4 Estimated marginal means of ANCOVA results for WCS, PSA, and volunteering task

Outcome measure	Group	Mean	Std. error	95% Confidence	
				Lower bound	Upper bound
WCS (Q6 – Q12) Connectedness to others	Group 1	−29.25[a]	13.21	−56.00	−2.53
	Group 2	31.24[a]	13.55	3.82	58.66
PSA Self-reported prosocial behaviour	Group 1	−0.05[b]	0.94	−1.95	1.85
	Group 2	2.21[b]	0.96	0.26	4.15
Volunteering task	Group 1	−0.12[c]	0.27	−0.66	0.43
	Group 2	1.12[c]	0.23	0.56	1.68

[a]Covariates appearing in the model are evaluated at the following values: T2 = 287.07

[b]Covariates appearing in the model are evaluated at the following values: T2 = 36.32

[c]Covariates appearing in the model are evaluated at the following values: T2 = 1.07

prosocial attitudes (PSA) indicated that the control group remained relatively unchanged throughout, while the MBI-CEW saw a significant increase and the MBI-CE saw a significant decrease from pre to post scores. Similarly, compared to the MBI-CE group, participants allocated to receive the MBI-CEW showed significant increases in their willingness to engage in volunteering activities. Overall, these results suggest that the inclusion of Buddhist ethics- and wisdom-based practices into an MBI, compared to ethics-based practices alone, positively influences prosocial behaviour. This distinction is crucial, highlighting significant differences between second-generation MBIs that include only ethics-based practices and those that incorporate both ethics and wisdom. Therefore, future research should clearly specify the practices included in different MBIs when making cross-study comparisons

The decrease in prosocial attitudes for the MBI-CE group was surprising, especially considering that previous studies have suggested the inclusion of ethics-based practices (such as loving-kindness) into MBIs is able to mitigate against potential adverse effects on prosocial behaviour (Bankard, 2015; Chen & Jordon, 2020). One potential reason for this finding may be due to the limited reliability of self-reported measures of prosocial behaviour causing inaccuracies with the data (Berry et al., 2020). It has previously been reported that there is a limited correlation between self-reported measures of prosocial behaviour and behavioural-based indicators (such as volunteering tasks, donation tasks, or game theoretical paradigms), bringing into question the reliability of such measures (Furnell et al., 2024b).

However, another potential explanation of these findings could be that the inclusion of ethics-based practices into MBIs is not enough to enhance prosocial behaviour or to mitigate against the possible development of self-centredness that is warned against while practising concentration-based practices alone (Gethin, 2011). This would imply that the additional inclusion of wisdom-based practices is a necessary implementation into MBIs if prosociality is a desired outcome.

Consistent with previous studies evaluating the effect of MBIs on self-reported mindfulness (Visted et al., 2015), the intervention groups both had a positive influence on participants' dispositional mindfulness compared to the control group. Likewise, consistent with previous studies evaluating the impact of MBIs on moral reasoning (Pandey et al., 2018), the intervention groups had a positive influence on participants' social responsibility, a subcategory of ethical responsibility relating to a moral sense of care and justice (Wray-Lake & Syvertsen, 2011). However, the current findings did not indicate a significant difference between the two intervention groups in either dispositional mindfulness or ethical responsibility, suggesting that the differing impacts

of prosocial behaviour between the MBI-CE and MBI-CEW groups were not correlated with these outcome measures.

A principal finding of the study was the strong correlation between participants' increased sense of connectedness with others and increases in their willingness to engage in volunteering activities among the MBI-CEW group. Similarly, findings suggested a correlation between participants' decreased sense of connectedness with others and decreases in prosocial attitudes of the MBI-CE group. These correlated relationships between connectedness with others and prosocial outcome measures indicate an associative relationship between participants' sense of connectedness and prosocial behaviour.

A similar relationship between sense of connectedness and prosocial behaviour has been identified in previous studies, highlighting how interpersonal self-transcendence is a potential mechanism linking meditation practices with prosocial outcomes (Barrows, 2024; Kang, 2019). Likewise, a previous systematic review assessing the relationship between MBIs and prosocial behaviour suggested that developing a sense of interdependence and common humanity (i.e. a sense of connectedness), rather than changes in empathetic concern or moral reasoning, are potential underlying mechanisms for prosociality (Furnell et al., 2024b). Additionally, consistent with previous studies (Chen & Jordan, 2020; Poulin et al., 2021), the current findings suggest that MBIs that do not include contemplating interdependence (i.e. the MBI-CE) may lead to a reduction in prosocial attitudes of some participants.

Furthermore, findings from this study are consistent with previous research indicating how distinct meditation practices within MBIs yield differential effects on participants (Sedlmeier, 2023; Singer & Engert, 2019). The current findings suggest a difference in how Buddhist concentration-, ethics-, and wisdom-based practices within MBIs influence participants' mindfulness, connectedness to others, and prosocial attitudes.

Similarly, Vargo and Silbersweig's (2012) S-ART framework, encompassing self-awareness, self-regulation, and self-transcendence, offers insights into the potential neurobiological mechanisms underlying meditation practice. They suggest that meditation operates through three fundamental mechanisms that mitigate biases associated with self-processing and promote a sustainable, healthy mindset. Initially, this involves the development of meta-awareness concerning one's own emotions and thoughts (self-awareness); this awareness then progresses into an ability to effectively modulate one's behaviour and regulate emotions (self-regulation), which ultimately leads to the cultivation of a positive relationship between self and other that transcends self-focused need and increases prosocial characteristics (self-transcendence) (Vargo & Silberswig, 2012).

While the S-ART framework (Vargo & Silbersweig, 2012) presents a neurobiological model for understanding the mechanism of meditation, it generalizes the effects of meditation rather than differentiating between meditation types. Adding depth to this discussion, Singer and Engert (2019) propose a three-module approach to meditation, focusing on specific processes and practices. Initially, their Presence Module includes practices like breathing meditations and body scans, which primarily enhance attention and interoceptive awareness, similar to the self-awareness component in Vargo and Silberswig's framework. Next, their Affect Module, akin to Vargo and Silbersweig's concept of self-regulation, involves practices such as loving-kindness meditation, aimed at regulating difficult emotions and modulating behaviour. Lastly, the Perspective Module parallels Vargo and Silbersweig's concept of self-transcendence, emphasizing practices that foster meta-cognition and perspective-taking on self and others (Singer & Engert, 2019).

These frameworks and insights into the mechanisms underlying meditation enhance our understanding of the specific effects of concentration-, ethics-, and wisdom-based practices employed in the present study. Concentration-based practices are closely linked to self-awareness mechanisms, deepening our understanding of one's thoughts and emotions and developing the ability to pay attention in the present. Ethics-based practices, aligning with self-regulation mechanisms, help manage emotions and behaviours but do not necessarily enhance prosocial behaviour. Conversely, wisdom-based practices, associated with self-transcendence mechanisms, foster a broader perspective and understanding of oneself in relation to others, which fosters increased prosocial traits. This clear distinction elucidates how each type of meditation practice contributes to the overall outcomes related to mindfulness, sense of connectedness, and prosocial behaviour, and subsequently supports the notion that wisdom-based practices might be necessary within MBIs for the promotion of prosocial behaviour.

Interestingly, support for this perspective is also found in traditional Buddhist teachings on meditation, such as those outlined in the Mindfulness of Breathing or *Ānāpānasati Sutta*. The *Ānāpānasati Sutta* begins with concentration-based practices to stabilize the body and mind through focus and attention, before progressing to ethics-based practices aimed at purifying the mind from unwholesome thoughts and emotions (Nhat Hanh, 1996). Finally, when the mind is both calm and pure, it becomes ready to engage the wisdom-based practices of contemplating impermanence, non-attachment, and letting go (Anālayo, 2019). These distinct meditation practices serve different purposes and functions, thus yielding differential effects on participants. It is through a combination of these techniques that practitioners are able to transition into a realm of non-duality and interdependence, which can lead to more compassionate and prosocial actions (Nhat Hanh, 2017).

Finally, it is crucial to evaluate the integration of Buddhist ethics- and wisdom-based practices into MBIs within a secular educational context. Two primary concerns arise in this regard: first, there exists a critique that MBIs may serve as a form of "stealth Buddhism", potentially leading to the unintentional indoctrination of students (Brown, 2016); and second, there are doubts about whether a secular audience can effectively understand, access, and embrace Buddhist-based practices (Compson, 2017).

Addressing the first concern is relatively straightforward: if participants are provided with informed choices and clear transparency regarding the Buddhist origins of the practices included in an MBI (as was done in this study) then there should be no compelling reason to exclude them from educational or secular settings (Haidar et al., 2023). The second issue, concerning the accessibility and applicability of Buddhist-based practices for students from secular and non-Buddhist backgrounds, presents a more complex discussion. To further explore this notion, a qualitative branch of this study (reported elsewhere) employed semi-structured interviews and survey questions with all participants. The interviews addressed three key questions: (1) How did participants experience the explicit inclusion of Buddhist ethics and wisdom-based meditation practices? (2) How did participants perceive the MBI's impact on their awareness and relationships with self and others? and (3) What different types of experiences emerged from engaging with Buddhist ethics compared to Buddhist wisdom practices, and did participants find one practice more beneficial than the other?

Limitations and Future Directions

The study was limited by a number of factors. Firstly, the relatively small sample size restricts the generalizability of the findings. Likewise, the study of a non-clinical sample of university undergraduate students means that the findings may not be applicable to individuals diagnosed with mental health disorders or to a wider non-university undergraduate student population. Additionally, the absence of a long-term follow-up assessment phase means it remains unknown how long the effects on the intervention persisted. Additionally, although the intervention groups and control group were appropriately matched in terms of key demographic variables (e.g. religion, ethnicity, age, and gender), the use of a convenience sample for the control group rather than participants being randomly assigned to the group may have led

to a non-statistically balanced selection on the given student population. For example, participants in the intervention groups had significantly higher pre-intervention scores for dispositional mindfulness (MAAS), compared to the control. This is perhaps due to students who opted to sign up for the interventions already having an interest in meditation and mindfulness practices, hence their willingness to participate in the course. Future studies could address these limitations by (a) utilizing larger sample sizes, (b) including a long-term follow-up assessment 3 to 6 months after the intervention, (c) employing randomization for all study groups, or (d) extending the matching procedure to include all sensitive pre-intervention variables.

Moreover, a potential concern is the homogeneity of the study's participants, as all identified as ethnically Chinese. Chinese culture, heavily influenced by Confucianism, Daoism, and Buddhism (Wong et al., 2012), might mean that even non-Buddhist or secular Chinese students are more familiar with Buddhist concepts than non-Chinese individuals, raising questions about the study's relevance in non-Chinese settings. However, this limitation may not be as problematic as it initially appears due to the secularization and modernization of contemporary Chinese society, potentially reducing the influence of traditional religious concepts, particularly among younger generations (Johnson, 2017). Furthermore, previous studies have shown similar positive effects of Buddhist-derived practices in non-Chinese contexts (Berry et al., 2020; Furnell et al., 2024b; Haidar et al., 2023), indicating broader applicability. Nevertheless, future research could address this limitation by replicating the study with more diverse populations to confirm the cross-cultural applicability of the findings.

Furthermore, although facilitator bias was assessed for the two intervention conditions, the study did not fully control for the impact of therapeutic alliance on outcome measures (which could arise from interactions with the course facilitator or participation in weekly group-based content). Future research could mitigate potential confounding factors by incorporating an active control condition, which would be matched on all non-specific factors (e.g. duration, group-based interaction, total intervention hours) but involve tasks and discussions of a non-meditative nature. Finally, future studies could also seek to directly compare the MBI-CEW with established programmes such as MBSR or MBCT, or any SG-MBIs, in order to provide clear information regarding the most suitable MBI to utilize for a given disorder, condition or population.

Another limitation of this study was the differing rates of missing data across groups, with the control group experiencing a high rate (25.96%) compared to the intervention groups (2.38% for MBI-CE and 6.25% for MBI-CEW), potentially affecting the validity of between-group comparisons in the initial phase of statistical analysis. Future studies could address this by implementing an active control group to enhance participant engagement and retention. The disparity in attrition rates between the control and intervention groups may be attributed to the credits awarded to participants in the MBI-CE and MBI-CEW groups, incentivizing them to complete all questionnaires. While the use of credits effectively reduced attrition, it may have introduced challenges, such as participants completing questionnaires superficially to earn credits. To address this, researchers could incorporate measures to ensure thoughtful engagement, such as including attention-check questions or providing additional instructions emphasizing the importance of careful responses.

In summary, findings suggest that the inclusion of Buddhist ethics- and wisdom-based practices into an MBI, compared to Buddhist ethics-based practices alone, positively influences prosocial behaviour. Additionally, there is an indication that the positive changes in prosocial tendencies are more closely correlated to changes in sense of connectedness with others than with heightened awareness (dispositional mindfulness) or moral reasoning (ethical responsibility). Although sense of connectedness and prosocial behaviour are important dimensions of psychological well-being (Seligman, 2002), it is important to acknowledge they are by no means the only factors. Future research is warranted to discern whether including ethics- and wisdom-based practices into MBIs has a positive influence on other dimensions of psychological well-being. Additionally, previous research has suggested the effectiveness of MBIs may be dependent on individual participants' personality traits (Chen & Jordon, 2020) and moral identity scores (Xiao et al., 2020). In instances where participants have low trait empathy or narcissistic tendencies, there is a potential that MBIs including only concentration-based practices have detrimental effects on prosocial behaviour (Chen & Jordon, 2020). Therefore, future research is needed to discern whether the inclusion of ethics- and wisdom-based practices into MBIs may mitigate against such unsalutary outcomes for specific participant groups. Finally, qualitative studies could be employed to assess secular and non-Buddhist participants' perspectives on their ability to access and engage with Buddhist ethics- and wisdom-based practices within MBIs.

Appendix

Table 5 Comparison between the MBI-CE and MBI-CEW weekly course structure

Weeks	MBI-CE (Group 1) (including concentration- and ethics-based practices)	MBI-CEW (Group 2) (including concentration-, ethics- and wisdom-based practices)
Theme:	**Awareness: Breath and Body** **(Intervention Stage 1)**	
Week 1	**Topic:** Breath: Present-Centered Awareness **Group-Based Content** *The three traps of meditation, the 10 zen ox herding images, what is mindfulness, what is the present moment?* **Formal Meditation Practice** *Mindfulness of the Breath* **Informal Meditation Practice** *Awareness of the breath during everyday experiences*	**Topic:** Breath: Present-Centered Awareness **Group-Based Content** *The three traps of meditation, the 10 zen ox herding images, what is mindfulness, what is the present moment?* **Formal Meditation Practice** *Mindfulness of the Breath* **Informal Meditation Practice** *Awareness of the breath during everyday experiences*
Week 2	**Topic:** Mindfulness of Body **Group-Based Content** *Mindfully eating a tangerine, how to tame your wondering mind, what is the body (Theseus' ship).* **Formal Meditation Practice** *Mindfulness of the Breath and Body Scan* **Informal Meditation Practice** *Awareness of the body during everyday experiences*	**Topic:** Mindfulness of Body **Group-Based Content** *Mindfully eating a tangerine, how to tame your wondering mind, what is the body (Theseus' ship).* **Formal Meditation Practice** *Mindfulness of the Breath and Body Scan* **Informal Meditation Practice** *Awareness of the body during everyday experiences*
Theme:	**Ethics: Feelings and Mind** **(Intervention Stage 2)**	
Week 3	**Topic:** Push and Pull of Feelings: Responding versus Reacting **Group-Based Content** *What do we mean by ethics, the Buddhist six realms of existence and how they relate to our everyday experiences, push and pull of feeling and emotions: responding not reacting.* **Formal Meditation Practice** *Mindfulness of the push and pull of feelings and emotions* **Informal Meditation Practice** *Awareness of feelings during everyday experiences*	**Topic:** Push and Pull of Feelings: Responding versus Reacting **Group-Based Content** *What do we mean by ethics, the Buddhist six realms of existence and how they relate to our everyday experiences, push and pull of feeling and emotions: responding not reacting.* **Formal Meditation Practice** *Mindfulness of the push and pull of feelings and emotions* **Informal Meditation Practice** *Awareness of feelings during everyday experiences*
Week 4	**Topic:** Observing the Quality of the Mind **Group-Based Content** *What is true tranquillity, understanding the mind (the mind as a black slate), understanding our preconditioning, the Buddhist five hinderances of the mind.* **Formal Meditation Practice** *Awareness of quality of mind and short Loving-Kindness Meditation* **Informal Meditation Practice** *Awareness of quality of mind during everyday experiences*	**Topic:** Observing the Quality of the Mind **Group-Based Content** *What is true tranquillity, understanding the mind (the mind as a black slate), understanding our preconditioning, the Buddhist five hinderances of the mind.* **Formal Meditation Practice** *Awareness of quality of mind and short Loving-Kindness Meditation* **Informal Meditation Practice** *Awareness of quality of mind during everyday experiences*

Table 5 (continued)

Weeks	MBI-CE (Group 1) (including concentration- and ethics-based practices)	MBI-CEW (Group 2) (including concentration-, ethics- and wisdom-based practices)
Week 5	**Topic:** Purifying the Mind **Group-Based Content** Brining loving-kindness practice into our daily lives, how to offer loving-kindness and to who. **Formal Meditation Practice** *Loving-Kindness Meditation* **Informal Meditation Practice** *Offering the loving-kindness mantra during everyday experiences*	**Topic:** Purifying the Mind **Group-Based Content** Brining loving-kindness practice into our daily lives, how to offer loving-kindness and to who. **Formal Meditation Practice** *Loving-Kindness Meditation* **Informal Meditation Practice** *Offering the loving-kindness mantra during everyday experiences*
Theme:	**Ethics: Ethical Practices** **(Intervention Stage 3)**	**Wisdom: Impermanence, Interdependence, No-self** **(Intervention Stage 3)**
Week 6	**Topic:** Living a Life of Compassion **Group-Based Content** *Understanding the meaning of compassion, exploring the Four Immeasurables (loving-kindness, compassion, sympathetic-joy, equanimity), understanding how to use them to purify the mind.* **Formal Meditation Practice** *Tonglen "sending and receiving" Compassion Meditation* **Informal Meditation Practice** *Being aware of the suffering in daily life and trying to offer calmness and compassion to the situation*	**Topic:** Impermanence: Coping with Change and Uncertainty **Group-Based Content** *Understanding the growth of Buddhism and the Four Noble Truths, exploring impermanence, understanding conventional and unconventional truth.* **Formal Meditation Practice** *Contemplation of Impermanence of Breath, Body, Feelings and Thoughts* **Informal Meditation Practice** *Being aware of the impermanence of a daily situation, feeling or thought*
Week 7	**Topic:** Sympathetic-Joy: Rejoyce in Others Success **Group-Based Content** *Understanding jealousy and sympathetic-joy; gratitude circle.* **Formal Meditation Practice** *Meditation of Joy and Gratitude* **Informal Meditation Practice** *Being aware of the joy that others are having around you, and smiling at that joy*	**Topic:** Attachment and Non-Attachment **Group-Based Content** *Understanding impermanence and the suffering caused from attachment, interconnectedness of our communities, gratitude circle.* **Formal Meditation Practice** *Meditation on Inter-being* **Informal Meditation Practice** *Being aware interconnectedness between you and nature, or you and your relationships and those around you*
Week 8	**Topic:** Equanimity towards Others **Group-Based Content** *Understanding equanimity; exploring how equanimity adds to loving-kindness, compassion and sympathetic-joy; exploring how to apply the Four Immeasurables to everyday life.* **Formal Meditation Practice** *Meditation of Equanimity* **Informal Meditation Practice** *Being aware of the good and bad things happening around you and responding with kindness*	**Topic:** Interdependence and No-self **Group-Based Content** *Understanding no-self and emptiness, no I or me – just we (case study of the Hopi people), exploring Buddha nature.* **Formal Meditation Practice** *Meditation of No-self* **Informal Meditation Practice** *Trying to look deeply at other people with your "Buddha Nature" and see their "Buddha Nature*
Theme:	**Reflections**	

Table 5 (continued)

Weeks	MBI-CE (Group 1) (including concentration- and ethics-based practices)	MBI-CEW (Group 2) (including concentration-, ethics- and wisdom-based practices)
Week 9	**Topic:** Course Reflection and Graduation Ceremony **Group-Based Content** *Reflecting on the various activities and meditation practices introduced throughout the course, awarding of certificates, awarding of gifts (each participant was provided a small statue of a meditating Buddha)* **Formal Meditation Practice** *Final group meditation sitting in front of the provided statue of a meditating Buddha offering gratitude for sharing this experience together*	**Topic:** Course Reflection and Graduation Ceremony **Group-Based Content** *Reflecting on the various activities and meditation practices introduced throughout the course, awarding of certificates, awarding of gifts (each participant was provided a small statue of a meditating Buddha)* **Formal Meditation Practice** *Final group meditation sitting in front of the provided statue of a meditating Buddha contemplating the connection between the Buddha nature in all of us*

Declarations

Conflict of Interest The authors declare no competing interests.

Ethics Approval This study received ethical approval from the University of Nottingham Ningbo China's ethics committee (where the study was conducted), as well as the University of Derby's ethics committee (the primary researcher's associated university).

Informed Consent All participants provided informed consent before participating in the study. Written consent was obtained after participants were fully informed about the study's purposes, procedures, potential risks, and benefits. Participants were assured of their right to withdraw from the study at any time without any consequences.

Use of AI Statement AI was not used for the writing and editing of this manuscript.

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